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ABSTRACT

Presented are a student workbook and teacher's manual for a unit which combines a study of water pollution with instruction in critical reading skills. In the two activities students study the types and effects of pollution in Lake Erie. At the same time they learn how to read critically, evaluate their reading skills, and analyze written material to determine the truthfulness and value of what is discussed. Included in the teacher's guide are an overview, objectives, suggested teaching approach, answers to review questions, and a list of references. (WB)

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OEAGLS - Oceanic Education Activities for Great Lakes Schools

POLLUTION IN LAKE ERIE: AN INTRODUCTION

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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SE 035 142

OEAGLS INVESTIGATION #8
Completed April 1980

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INVESTIGATION

POLLUTION IN LAKE ERIE: AN INTRODUCTION

INTRODUCTION

Lake Erie has always been a valuable resource for the State of Ohio. Within the past 20 years there has been concern that the lake may be dying because of the effect of human activities. Could we lose this resource one day because of pollution?

In this activity you will study problems associated with water pollution in Lake Erie. The activity will also help you develop strategies for reading science articles skillfully and critically.

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OBJECTIVES

When you have completed these activities, you should be able to:

1. Read science articles more skillfully by

   a. recognizing the main topic,
   b. recognizing the subtopics, and
   c. organizing related articles under each subtopic.

2. Read science articles critically by

   a. examining the qualifications of the author(s),
   b. determining when the article was written,
   c. separating facts from opinions,
   d. recognizing emotional or persuasive language, and
   e. weighing evidence for conclusions.

3. Identify the major sources of pollution in Lake Erie.

4. Determine how Lake Erie's polluted water has affected the plants, wildlife and people which depend on it.

ACTIVITY A

HOW SKILLFULLY CAN YOU READ A SCIENCE ARTICLE?

The following article introduces you to the sources of pollution in Lake Erie. For the article to accomplish its task, however, you must be sure to read the material skillfully.

Here is a tip to help you develop a strategy for reading.

A. The article discussed three major ideas. You can identify these ideas by picking out key terms in paragraphs 1, 6 and 9. Paragraph 1, for example, could be condensed into the main idea "People and Industries Killing Lake Erie." That gives you a clue about what to look for in the first section--HOW are people and industries killing the lake?

B. See if you can condense the first sentence of Paragraph 6 and all of Paragraph 9 so that you have the main ideas for the sections that follow those paragraphs.

Paragraph 6 _____

_____

Paragraph 9 _____

_____

C. Read the entire article with the ideas of each section in mind. Try to find explanations for and details about the key statements you have found.

D. When you finish reading and feel confident that you have grasped the major ideas, turn to page 5 and answer the questions. This is a way of self-checking your reading skills.

TRUE MURDER STORIES

SO LONG, LAKE ERIE

The killing of Lake Erie is a mob job - the combined efforts of some 11 million people who live near its shores and along the rivers and tributaries that empty into it. They are being aided and abetted by 360 industrial companies that discharge their wastes into the water.

Nine million people in the area are served by sewers and sewage treatment plants. But more than half of the plants give only primary treatment; that is, they strain out the solids and sludge, and then pump out the rest of the liquid without further treatment into the nearest waterway. Two million people live without sewers at all and discharge their raw wastes directly into the rivers and the lake. Thus sewage is one of the main sources of pollution in Lake Erie.

Giant industries discharge 9.6 billion gallons of water a day into the lake and its rivers, much of it contaminated with dangerous and filthy pollutants. These include acids, oil, cyanide, iron, phenol, and toxic metals such as copper, cadmium, chromium, lead, nickel, zinc, and iron. Poisonous chemicals enter the water from pesticides off agricultural land and from plastics and chemical industries. Phosphates pour in from fertilizers and detergents.

Also, power plants contribute thermal pollution to the water. And the radioactive content of the lake is rising, partly from the increasing numbers of atomic power plants being built along the shores.

Other pollutants in the lake include oily wastes, fish entrails, and human excrement from commercial and pleasure boats. In addition, spoil from harbor dredging - 6 million cubic yards each year - is dumped into the middle of the lake. Soil particles picked up from eroded land areas and from highway and urban development also clog the water. Trash and debris are widespread at all depths of the lake.

All of these pollutants have varied effects on Lake Erie. Some use up the oxygen in the water when they decay. Others overstimulate the growth of underwater plants, leading to accelerated eutrophication, so that even more oxygen is lost. Some pollutants are poisonous, killing plant life, microorganisms, and the fish that feed upon them. And the decay of all this matter causes even more decomposition and loss of oxygen. Other pollutants color and obscure the water so that the sunlight cannot get through, causing the death of organisms that depend on sunlight. The inevitable result, if the pollution of Lake Erie continues, is a dead lake - water that is of no value to man or animal.

Eighty-seven beaches on Lake Erie were closed down by 1968. Commercial and sport fishing declined disastrously, and now there are restrictions on the sale of fish caught in Lake Erie because they are so contaminated. Some species of fish have disappeared altogether. Ships are prohibited by the Public Health Service from taking drinking water out of the lake unless they are equipped to give it full cleansing treatment. In Cleveland, the inadequate sewage treatment system is allowing raw sewage to contaminate the residents' own drinking water. A doctor in the area made tests which showed that there were dangerous germs in water that had sat in the pipes overnight. He regularly treats patients for vomiting and diarrhea after they have drunk water or eaten food out of the lake.

Erie is a tough little lake. Because it receives a high volume of good quality water from Lake Huron and empties out vigorously over Niagara Falls, it has a rapid flush-out time. This helps to replace the polluted water with cleaner water. But the attacks upon Lake Erie are now so strong and so unceasing that little hope remains for its survival.

The forces of law and conservation are making rumbling noises, threatening to take action against the industries and cities that are the major polluters. But they are going to have to move fast, enforce the spending of vast amounts of money, and do a major clean-up in record time if Lake Erie is to be saved.

In 1970 federal investigators reported that most cities and some industries were falling far behind pledges they had made earlier to clean the water that flows into Lake Erie. The federal government also was accused of failing to provide the money it had promised and of failing to clean the waste waters under its own control.

From POLLUTION: THE WATERS OF THE EARTH by Claire Jones, Steve J. Gadler, and Paul H. Engstrom, copyright c 1970 by Lerner Publications Company, Minneapolis, Minnesota. Used by permission of the Publisher.

QUESTIONS

After reading the article, you should have an idea of the major sources and types of pollution in Lake Erie and the general effects these have on the lake and its inhabitants. Before going on, be sure you have understood the major ideas in the article. Test yourself by answering the following questions.

1. List ten major sources of pollution for Lake Erie's waters.

1. _____	6. _____
2. _____	7. _____
3. _____	8. _____
4. _____	9. _____
5. _____	10. _____

2. The authors of the article "So Long, Lake Erie," noted that approximately 360 industrial companies discharge their wastes into the lake. From the article, identify the types of substances that make up industrial waste. You may use some of the same answers you found for number 1.

_____

_____

_____

3. List six ways that pollution in Lake Erie has decreased the lake's value.

_____

_____

_____

_____

4. From your understanding of what you read in the article, describe the water of Lake Erie and the conditions of life within the lake.

_____

_____

_____

_____

The article mentioned that one of the major effects of pollution on Lake Erie was "eutrophication." To better understand eutrophication, read the paragraph below from the book Water Wasteland, by David Zwick and Marcy Benstock. Remember to first identify the general statement that will give you a clue as to what kind of information to expect in the reading

"Phosphorus stimulates the growth of algae and aquatic weeds in fresh-water lakes and rivers. Sudden and massive algal growth (called blooms) appear in many American waterways in early spring and summer. They are ugly growth, but the problem is not solely esthetic. These blooms age a body of water as they die and decay. Oxygen and other resources are exhausted in the oxidation of large amounts of dead organic matter. Slime and scum appear, flows are clogged, and the water is unable to support fish or other normal life forms. This natural aging process, by which lakes and rivers turn to swamps and then dry land over the course of centuries, is called eutrophication. When phosphorus and other nutrients for algal growth pour into our lakes and rivers from municipal and industrial wastewater and from urban and agricultural runoff, the natural aging process is speeded up, often many hundreds or thousands of times. Lakes and rivers "die" an early death from over-enrichment, overblooms, and what might be called overkill in the algal life cycle."

5. Using the information from this paragraph, construct a chart which shows the events, in order, which take place in eutrophication.

6. From the chart and the article, do you think that Lake Erie is dead?_____Explain your answer.

_____

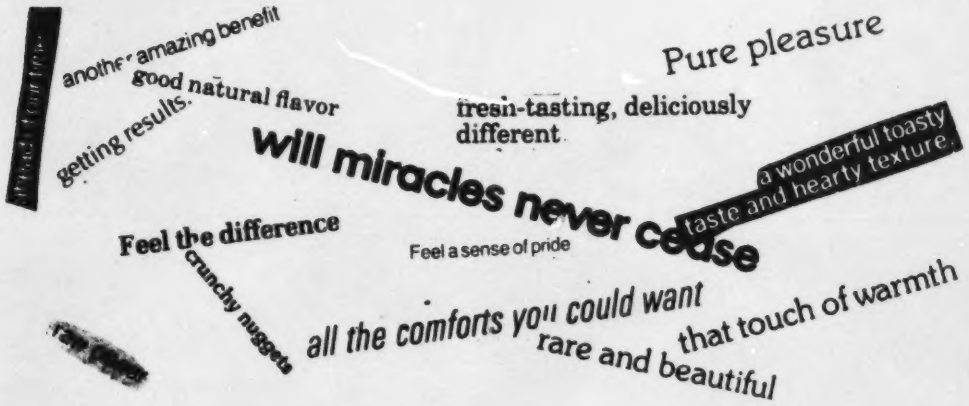
_____

ACTIVITY B

HOW CAN YOU BECOME A CRITICAL READER?

Do you believe everything you hear or read? Certainly not. You probably have some sources of information that you trust completely, though--the television news reporter, the front page headlines, or maybe a teacher who seems to know a great deal about a lot of things. You feel that what these sources report must be true.

Whenever you read or hear something, you react to it in some way. Whether you are aware of it or not, you make a decision about accepting or rejecting the information. You may also decide, based on how important or interesting the information seems to be, whether to try to remember it.



Speakers and writers sometimes take advantage of people by trying to make them react in a certain way. By using certain words or tones of voice, they try to persuade us that what they are saying is true. For instance, the article "So Long, Lake Erie" paints a bleak picture of Lake Erie's future. While scare tactics are not really an approved method of getting people's attention, sometimes they do just that. In the late 1960's for example, WBBM-TV in Chicago aired a special called "Too Thick to Navigate, Too Thin to Cultivate," exposing Great Lakes pollution problems. NBC News followed with a special documentary on "Who Killed Lake Erie?" Coming as they did during a growing environmental movement, these and other doomsday reports served to draw our country's attention to lake problems. Under public pressure, some industries and communities eventually corrected some of the bad things they were doing to the lakes. The Great Lakes still need help, but those who accuse are expected to offer suggestions along with their criticisms.

PROCEDURE

In order to become a critical reader, one who can determine the truthfulness and possible value of what is read, you have to look carefully at every word of the writer. You should try to:

a. avoid quick judgements,
b. sort out arguments and
c. weigh evidence.

Look back at the "So Long, Lake Erie" article and answer these questions.

1. When was it published? _____ What was happening in this country at that time? _____

_____

Have conditions changed since then? _____

_____

Read "About the Authors" below.

About the Authors

Pollution. The Waters of the Earth is one of eight books on pollution written by Claire Jones, Steve J. Gadler, and Paul H. Engstrom. This volume was a cooperative effort, each person contributing his or her own knowledge and experience, with the final result a kind of "literary synergism."

Paul H. Engstrom is a minister, a lawyer, and a family counselor, as well as president and cofounder of the Minnesota Environmental Control Citizens' Association. Under his leadership, MECCA has worked for preservation of Lake Superior and the Mississippi watershed, reduction of radioactive pollution, reuse of materials in solid waste, and many other environmental goals to improve the quality of life. Thus Rev. Engstrom's major contribution to this series of books on pollution was a social and legal perspective resulting from direct experience.

Steve J. Gadler also is experienced in the fight to save the environment; he is a registered professional engineer who was an environmentalist long before pollution became a national issue. A retired Air Force Colonel, Mr. Gadler has for many years been asking pertinent, revealing questions about the damage caused by our industrial society. He has been especially concerned about radioactivity, which is an invisible but deadly threat to life itself. In 1967, the governor of Minnesota appointed him as a member of the state's Pollution Control Agency. Mr. Gadler's technical expertise is apparent in each book in the series.

Claire Jones is an experienced writer who first became aware of the dangers of pollution in 1956, when she lived through one of the famous London killer smogs. Teaming up with Rev. Engstrom and Mr. Gadler gave her an excellent way to express her concern over the condition of the environment. However, her contribution has been more than a concerned citizen's point of view and a crisp, sparkling writing style. A native of England, Mrs. Jones brings a special international outlook to this series. None of the problems of pollution can be seen as less than worldwide, and this important perspective gives *The Waters of the Earth* added value.

2. Who wrote the article? _____

   What qualifies the authors to write about the subject?

   _____

   _____

3. Does the article state opinions or facts? _____

   How did you decide? _____

   _____

4. What is the writer's conclusion? _____

   _____

   Does the article have evidence that supports the conclusion?

   _____

5. Does the article use words designed to persuade your thinking? _____ If so, list three or four of these words or groups of words. _____

   _____

6. Is there information that conflicts with what this writer has said? _____ What is the source of the conflicting information? _____

   _____

The following article is a shortened form of a booklet prepared by the Ohio Environmental Protection Agency in March 1980. Read this section (pages 10 and 11) skillfully and critically, then look back at your answer to Question 6 above.

LAKE ERIE

by

James P. Barry*

Introduction

Lake Erie is one of the best known bodies of water in the country. It is well known in a negative way--nearly everyone has heard that the lake is badly polluted. That is certainly true. But many things that have been written or said about Lake Erie are not true. The lake is not a swamp, it is not dying, it is not without fish. There are places where it is beautiful; there are places where you can go swimming, and the fish catch is reaching record proportions. At the same time, the lake has many problems. This article will tell you what some of them are, how they developed, and what we can do and are doing about them.

What Happened to the Lake

As our country grew, all the things that people did on the land also affected the lake. When forests were cleared for farming, the land itself often washed into the lake; The Maumee River which flows into the western end of Lake Erie carries silt all the way from Indiana farmlands and piles it on the bottom. And as cities grew around the lake, their sewage and factory wastes were usually piped directly into it or into the rivers flowing to it.

By 1970 nearly everyone saw what bad condition the lake was in. It had many problems caused by oil and industrial chemicals. But the worst problems were caused by sewage, by fertilizer that washed off fields, by other material acting as nutrients to the algae and other tiny plants in the water causing them to grow. Eutrophication is the process of aging and it is speeded up if people pollute or partly fill in a lake of normal size. People have certainly polluted Lake Erie, and in a sense they have partly filled it in by causing silt and sediments to wash into it. This action has caused the kinds of plants and fish to change and the numbers of them to increase. So to some extent, Lake Erie has been affected by this aging process of eutrophication. This fact has caused some people to say that the lake is dying, but Lake Erie is so large that the rules pertaining to smaller lakes do not fully apply to it. If we continue polluting the lake over a long period, eutrophication could pose a serious threat. But today many of the ways we have damaged the lake can still be corrected, and a number of things are now being done to correct them.

What Is Being Done

The material that causes the most trouble in Lake Erie is phosphorus, for it is the phosphorus is sewage, in fertilizer washing in from the fields, and in other sources that feeds the algae and makes them grow. (Sewage contains phosphorus both in human wastes and in the great amount of detergents that we use for washing and then drain into our sewage systems.) Perhaps the next biggest problem comes from bacteria that can cause disease. When they are in water, swimming can be dangerous and beaches must be closed.

Much of the phosphorus and most of the dangerous bacteria come from sewage, and so the first thing that was done to help the lake was to build more sewage treatment plants and to make the old plants better. Hundreds of millions of dollars in federal grants (administered in Ohio by the Ohio EPA) were given to towns and cities for their treatment plants. Cleveland, for example, has a treatment system that serves over 1,280,000 people in Cuyahoga County and that was first built many years ago to take care of far fewer people. There are three treatment plants in Cleveland. Both the network of sewer lines and tunnels running to these plants, and the plants themselves, are being rebuilt and improved. The work will continue over several years and will cost about $500 million. Similar programs are going on in towns and cities all around Lake Erie. The main purpose of all this work is to keep phosphorus and disease germs out of the lake now and in the future.

Another important kind of pollution comes from toxic substances. These range from pesticides that were used on farms and orchards and then washed into the lake to chemicals drained into the lake by industry. These substances can kill or deform fish, birds, and other animals, and also can be carried in the flesh of animals that seem healthy. A person who eats such a fish or bird or muskrat can absorb some of the poison and may be affected by it. Most of the dangerous pesticides have now been banned by law. Another poison, mercury, is no longer being drained into the lake and may, in time, gradually disappear from it.

There are other poisons in the water and in the mud on the bottom, but the chemicals called PCBs seem to cause the most problems today. They have been used in making a great number of items for the past forty years, and so they not only are in the bottom mud but also, things made of them are at many locations around the shore, where rain and snow can wash over them and carry PCBs to the lake. And PCBs are still used in some manufacturing. Ways of controlling them are being studied, and the U.S. and Canadian governments have passed or are in the process of passing laws that limit their use.

The Situation Today

Lake Erie is still polluted, but the flow of pollution into the lake is slowing. Today the lake is at a point of balance; in years when the water level is high and more water flows through the lake, diluting and washing out the pollutants, it gets better, but in other years it does not. At certain places around the shore, however, the water is definitely better than it was. There are places where new or better sewage treatment plants have been built, or where other local action has been taken to stop pollution. As one result, most of the beaches that were closed because of pollution have been opened again. And walleye, one of the preferred kinds of fish, is coming back to the delight of hundreds of sport fishermen. But we must keep working to repair the damage we have done the lake. There are still significant problem areas that remain to be corrected. The cost of cleaning it up is not great if we think in individual terms. Experts believe that to clean up the lake it would cost each person living on its shore, each year about the same amount as a carton of cigarettesor a day's food. That is a price we can afford to pay for Lake Erie. What we must do now is get together and do the job.

---

*James P. Barry is an author and photographer who specializes in Great Lakes subjects. He made his first voyage on a lake freighter at the age of eight, graduated from Ohio State University with distinction, and has written ten books, half of them dealing with various aspects of the Lakes.

This article was adapted from a pamphlet prepared for the Ohio Environmental Protection Agency, March 1980.

7. Turn back to pages 8-9. On a separate sheet of paper, answer Questions 1-6 again, this time about the James Barry article.

   Compare your answers for the two articles.

8. Which article do you place more confidence in?

   _____

   Why?_____

   _____

9. Summarize what you believe to be the present condition of Lake Erie.

   _____

   _____

   _____

   _____

JUST FOR FUN

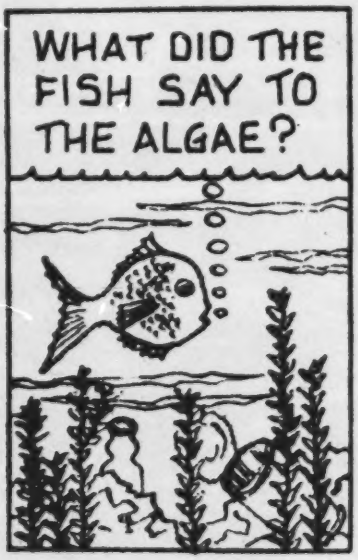
Here is a puzzle you can solve using words related to the Lake Erie environment.

1. Unscramble these five words. The hints beside each scrambled word will help you.

2. Write each unscrambled word in the boxes beside it. Put one letter in each box.

3. Unscramble the circled letters to find the answer to the picture riddle.

A type of pollution caused by heat.	MARLHET	☐○☐☐○☐
Toxic chemicals.	SNOPOSI	○○○☐☐☐☐
In 1970, 360 of these polluted Lake Erie.	RUDINSSITE	○☐☐○○☐☐☐
Murky water won't let this through.	GLISTHUN	☐☐○☐☐☐○
A metal that poisons animals.	PROCEP	○○☐☐☐○



"This lake is too rich in nutrients. That's _____."

(Adapted from "Environmental Activities News Bulletin," January, 1972.)

REVIEW
QUESTIONS

1. What are the major sources of pollution in Lake Erie?

_____

_____

_____

2. How are the plants, wildlife and man affected by Lake Erie's water pollution problems?

_____

_____

_____

3. List three things you should look for in something you read to tell if it is worth believing.

_____

_____

_____

Ohio Sea Grant

OEAGLS - Oceanic Education Activities for Great Lakes Schools

POLLUTION IN LAKE ERIE: AN INTRODUCTION

by

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TEACHER GUIDE

OEAGLS INVESTIGATION #8
Completed April, 1980

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INVESTIGATION

POLLUTION IN LAKE ERIE: AN INTRODUCTION

OVERVIEW

Activity A is designed to present factual information about the types of water pollution in Lake Erie and their general effects. At the same time, information is given on how to read materials skillfully in order to benefit most from them. Students practice a given reading strategy and then test their new skill by answering questions based on the material read. In Activity B students analyze reading materials to try to determine the truthfulness and possible value of what is read.

PREREQUISITE STUDENT BACKGROUND

Reading ability on level of grade 5 or above. Articles "So Long, Lake Erie" and "Great Lakes Cleanup Making Progress" (both included in Student Guide), pencil or pen.

OBJECTIVES

When students have completed these activities they should be able to:

1. read science articles more skillfully by
   a. recognizing the main topic discussed,
   b. recognizing the subtopics discussed, and
   c. organizing under each subtopic the details relating specifically to it.
2. read science materials critically by
   a. determining who wrote the article and when,
   b. separating facts from opinions,
   c. recognizing emotional or persuasive language, and
   d. weighing evidence for conclusions.
3. identify major sources of pollution in Lake Erie.
4. determine how Lake Erie's polluted water has affected plants, wildlife and people who depend on it.

SUGGESTED APPROACH

Activities A and B are most effective if done by individual students and then followed by class discussion of results.

There are two good 16 mm films that relate to this topic. Either could serve as an effective introduction or follow-up, but because of overlapping content, the use of only one film is recommended. The Aging of the Lakes (13 min., Encyclopedia Britannica Films, 1971) defines and documents the myriad pollution problems faced by lakes in general. The generalizations about lake problems are brought home to the Great Lakes in such examples as the description of Chicago's efforts to combat pollution, and the mention of thermal pollution, especially on Lake Michigan. This is a short, factual introduction to pollution problems without a "gloom and doom" approach. The Great Cleanup (54 min., U.S. Environmental Protection Agency/Environment Canada, 1976) provides a brief history of events leading up to the agreement between the U.S. and Canada to clean up the Great Lakes. It presents the pollution problems and shows what is possible by way of solutions. The film comes on two reels and may be too long for classroom use.

ACTIVITY A

HOW SKILLFULLY CAN YOU READ A SCIENCE ARTICLE?

PROCEDURE

Keywords: pollution, eutrophication

Review with students the procedure suggested on page 2 of the Student Guide. For younger students it may help to have the class as a group identify the main ideas in paragraphs 1, 6 and 9.

A. Paragraph 1 is used as an example, condensing it to say "People and Industries Killing Lake Erie."

B. Paragraph 6 introduces the effects of pollutants on the lake.

C. Paragraph 9 begins a section on what is being done about the problems.

With the three sub-headings in mind, students should be able to read skillfully enough to at least know where to find the answers to the questions given. Many questions are rather specific, so allow the students to look back at the article if they need to.

1. Ten major sources of pollution in Lake Erie:

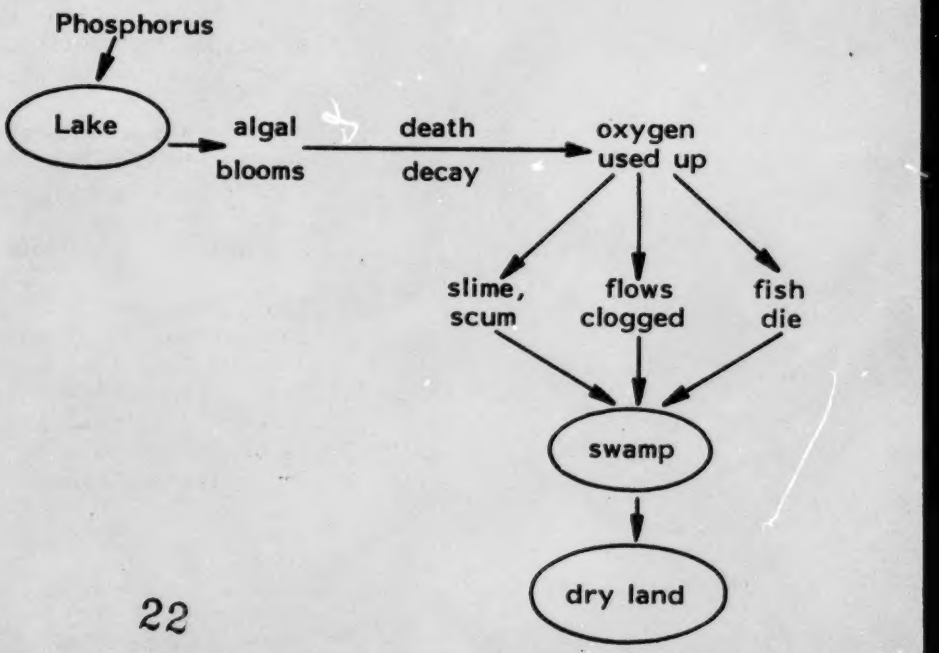
   1. sewage
   2. poisonous chemicals from agriculture, industry
   3. soil from erosion
   4. power plants (thermal pollution)
   5. spoil from dredging
   6. industries (toxic metals, oil, acids)
   7. boat wastes
   8. trash
   9. radioactive materials from atomic power plants
   10. phosphates from fertilizers and detergents

2. Industrial wastes include acids, oil, cyanide, iron, phenol, toxic metals and poisonous chemicals from pesticides and from plastics and chemical industries.

3. The lake's value has decreased in these ways: using up oxygen in the water, stimulating the growth of water plants, killing organisms, preventing sunlight from penetrating the water, causing fishing industry to decline, and making people sick, Students may infer other effects or offer personal experiences that should be discussed as additional answers to this question.

4. Answers will vary based on student maturity and understanding of the materials. Be accepting and discuss all possibilities with the class.

5. Eutrophication chart (may vary in form, but should include all major parts):



6. From this chart, it appears that Lake Erie is not dead. It supports life, does not have large amounts of slime and scum, its flows are not clogged and it does not show evidence of turning into a swamp. The lake is, however, living much too rapidly.

ACTIVITY B

HOW CAN YOU BECOME A CRITICAL READER?

Young readers tend to accept what they read in the news media or see on television as being completely true. Conflicting accounts are confusing to them, because they often lack the ability to discriminate between facts, exaggerations, and falsehoods. They have little experience upon which to base their judgements, so they accept the opinions of "experts."

PROCEDURE

The questions for article analysis were taken from Thomas and Robinson's "Check List on Critical Evaluation" (see Robinson reference, page 7).

For students to answer the questions it will be necessary to supplement the Student Guide with your own guidance and information from the Teacher Guide.

1. 1970. The article was a part of the "alarmist" phase of environmental protection. People were actively pointing out how bad the conditions of the environment had become. NBC's "Who Killed Lake Erie" came in late 1969, for example. Conditions have improved greatly since then. Recognizing its mistakes, society has determined to correct many of its abuses to the environment.

2. The authors were mainly concerned citizens. Their professional training did not involve any preparation for serving as water pollution experts.

3. It appears that the article states facts. There are no words that indicate an opinion is being stated, like "it seems," "probably," and such.

4. From Paragraph 8--"the attacks upon Lake Erie are now so strong that little hope remains for its survival." The article has evidence that points to this conclusion. There are glimmers of hope, as in Paragraph 9, but they are quickly extinguished by more pessimistic reports.

5. Yes. Some persuasive terms used are: disasterously, raw wastes, dangerous and filthy, a mob job, and so forth.

6. Yes. See the James Barry article. Barry is a respected writer on Great Lakes topics. The article is published as an official statement from the Ohio Environmental Protection Agency.

7. Answers will vary. Discuss reasons for different answers.

By this time students should be able to discuss how public opinion can be swayed by one-sided arguments and how important it is to not only read skillfully but interpret carefully. You may want to use the following editorial cartoon as a focus for such a discussion

Dead Sea Scrolls

REVIEW QUESTIONS

1. (Any four or five of the following should suffice.) Sewage, poisonous chemicals, soil, hot water, dredge spoil, industries, boat wastes, trash, radioactive materials, and phosphates pollute Lake Erie

2. Oxygen has been used up so some animals cannot survive, water plants become too abundant and prevent sunlight from penetrating the water. The fishing industry has declined, people have become sick, and beaches have been closed.

EVALUATION

This activity is not designed to teach facts about pollution, but rather to develop particular reading skills. For this reason, no objective questions have been developed as an evaluation mechanism. Instead, we recommend that if specific evaluation is needed, you may use the actual answers students fill into the Student Guide blanks, especially in the Review Questions.

JUST FOR FUN (ANSWERS)

T H E R M A L

P O I S O N S

I N D U S T R I E S

S U N L I G H T

C O P P E R

Riddle: "That's EUTROPHICATION."

FOR FURTHER INVESTIGATION

Numerous references and activity guides about water pollution are available and most biology and life science textbooks include sections related to this topic. Several good references are included in the bibliography.

If interest in water pollution is high, consider making a study of a nearby lake or stream during the course of a year. Basic physical and biological characteristics can be determined using standard equipment available in most school laboratories, and water analysis can become fairly sophisticated if you use a test kit such as those marketed by scientific supply companies.

For reviews of historic water pollution incidents, consult the Reader's Guide to Periodic Literature. Some references you may be interested in for their photographs and general information are:

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ACTIVITY GUIDES

Coon, Herbert L. and Charles L. Price, Water-Related Teaching Activities. Columbus, OH: ERIC Center for Science.

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Goldman, Marshall. Controlling Pollution: The Economics of a Cleaner America. Englewood Cliffs, New Jersey, Prentice-Hall, 1967.

Hyde, Margaret Oldroyd. For Pollution Fighters Only. New York: McGraw-Hill, 1971.

McCoy, Joseph. Shadows Over The Land. New York: McGraw-Hill, 1971.

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